

**SEEING RED AND SHOOTING BLANKS:
A STUDY OF RED QUASARS AND BLANK FIELD X-RAY SOURCES**

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A major paper (Cagnoni et al.) has been written and submitted to the Astrophysical Journal summarizing the results of this work. (Abstract below). The work formed the basis of a large fraction of the PhD thesis of Dr. Ilaria Cagnoni, who was awarded her degree in October 2001. A second paper describing optical and infrared followup imaging is in preparation.

The results reveal a fascinating trove of novel X-ray sources: high redshift clusters of galaxies found efficiently; X-ray absorbed, optically clean AGN, which may be the bright prototypes of Chandra Deep Survey sources; and several with a still unknown nature.

Recent XMM-Newton results confirm the existence of this class of X-ray source with much refined positions. We expect to pursue this avenue as the next natural extension of this project.

Abstract

ROSAT Blank Field Sources I: Sample Selection and Archival Data

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We have identified a population of ‘blank field sources’ (or ‘blanks’) among the *ROSAT* bright unidentified X-ray sources with faint optical counterparts. The extreme X-ray over optical flux ratio of blank field sources is not compatible with the main classes of X-ray emitters except for extreme BL Lacertae objects at $f_X/f_V \leq 35$. From the analysis of *ROSAT* archival data we found evidence for only three sources, out of 16, needing absorption in excess of the Galactic value and no indication of variability. We also found evidence for an extended nature for only one of the 5 blanks with a serendipitous HRI detection; this source (1WGA J1226.9+3332) was confirmed as a $z=0.89$ cluster of galaxies. Palomar images reveal the presence of a red ($O - E \geq 2$) counterpart in the X-ray error circle for 6 blanks. The identification process brought to the discovery of another high z cluster of galaxies, one (possibly extreme) BL Lac and two apparently normal type 1 AGNs. These AGNs, together with 4 more AGN-like objects seem to form a well defined group: they present type 1 X-ray spectra but red Palomar counterparts. We discuss the possible explanations for the discrepancy between the X-ray and optical data, among which: a suppressed big blue bump emission, an extreme dust to gas ($\sim 40 - 60$ the Galactic ratio) ratio value and a high redshift ($z \geq 3.5$) QSO nature. These AGN-like blanks seem to be the bright (and easier to study) analogs of the sources which are being found in deep *Chandra* observations. Five more blanks have a still an unknown nature.